

DINOSAURS!

• DISCOVER THE GIANTS OF THE PREHISTORIC WORLD •



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DINOSAURS!

• DISCOVER THE GIANTS OF THE PREHISTORIC WORLD •



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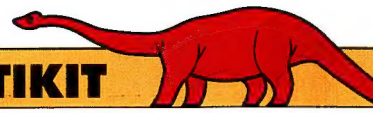
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SAUROPELTA

Not even a huge and vicious hunting dinosaur stood much chance against *Sauropelta*'s amazing defence system.



Sauropelta was as long as an elephant and tall enough to look an adult human straight in the eye. As it browsed among low-growing ferns and shrubs, *Sauropelta* did not worry too much about hiding from predators. This plant-eater was protected by a remarkable coat of armour. Bony plates, spines and spikes covered the whole of the top half of its body, leaving only its belly open to attack.

SUPER SHIELD

A mosaic of large bony plates and small pebbly bumps left no chink in *Sauropelta*'s body armour. Its armoured shield continued all along its tapering tail.

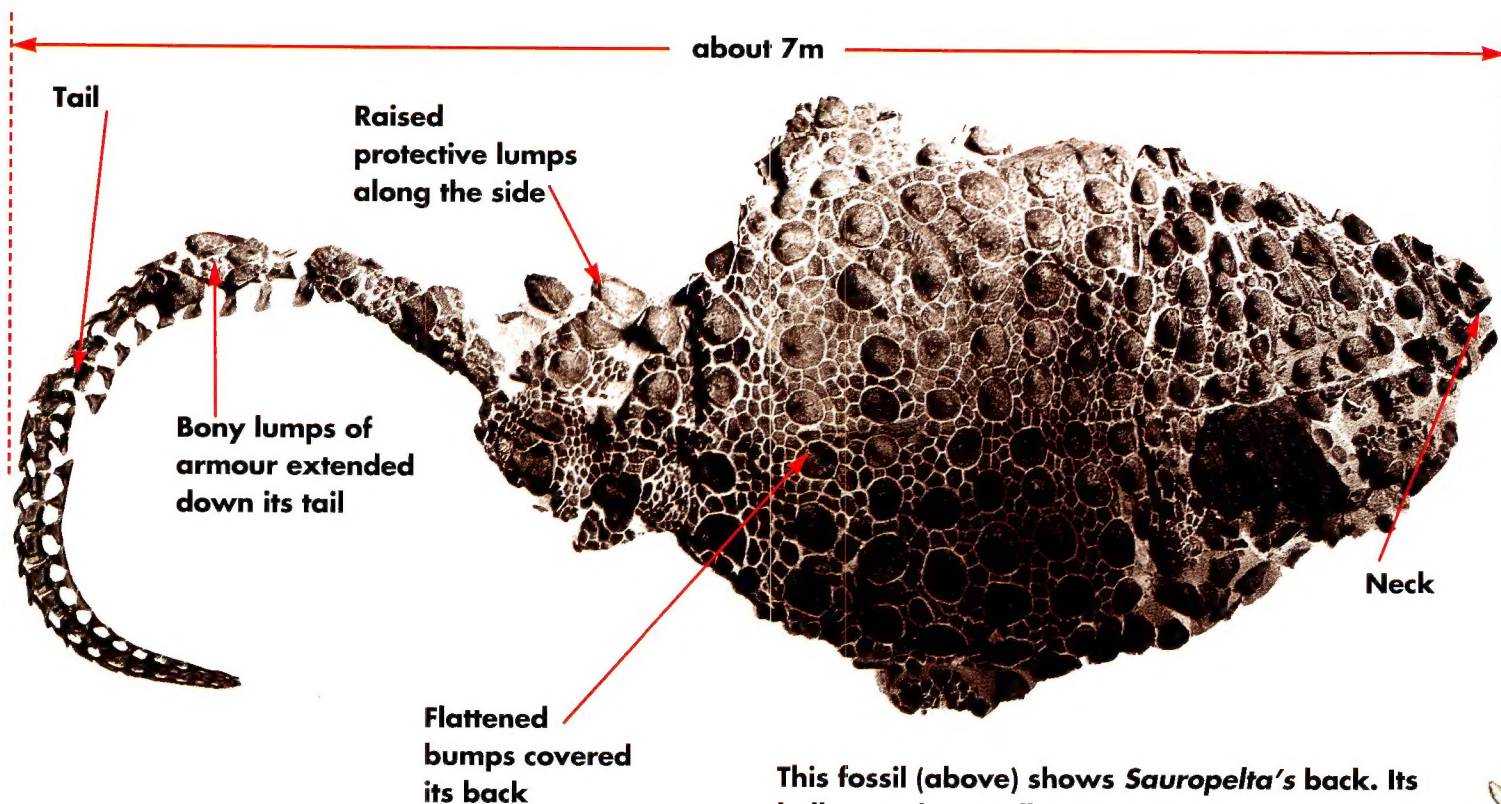
UNDER ATTACK

A deadly frill of long spikes pointed out and backwards along its sides. If a predator attempted to bite through *Sauropelta*'s armour it ended up with several broken teeth! A predator had only one chance of defeating *Sauropelta*. If it could flip the dinosaur on to its back, *Sauropelta* would not stand a chance of escaping. Its enemy would be free to make a meal of the only unprotected part of its body. But *Sauropelta* had ways of making sure that this did not happen.

FIRM ANCHOR

As a predator approached, *Sauropelta* probably dropped to the ground. Using its flexible shoulder muscles *Sauropelta* could draw in its front legs rather like a tortoise does today. *Sauropelta* dug its claws into the ground and sat out the attack, anchored to the spot.





This fossil (above) shows *Sauropelta's* back. Its belly was less well protected.

SPIKY APRON

As their front legs were small and weak, carnosaurs had to use their jaws and hind legs to try to overturn *Sauropelta*. But a spiky apron along its sides prevented any predator from getting a foothold. *Sauropelta's* broad, heavy body also made it as difficult to lift as a Chieftain tank. The frustrated predator probably stomped off to find a more promising victim.

Is it true

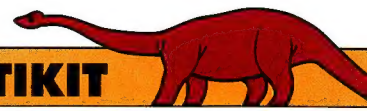
that fossils can tell us about a dinosaur's health?

Yes. Dinosaurs suffered from aches and pains like any other animal. When studying fossil bones, scientists have sometimes found places where broken bones have mended. There is also evidence to suggest that dinosaurs may have suffered from arthritis-like diseases.

COUNTER ATTACK

It is possible that *Sauropelta* did not always wait for its attacker to give up and go away. It used its body weight to defend itself. It had strong elbow muscles which made it possible for *Sauropelta* to lunge forward or swerve to the side. A nasty clout with its heavy tail or the spikes along its body could inflict a deep wound. This powerful plant-eater may even have toppled a hunting dinosaur over. With a bit of luck, this might have given *Sauropelta* a chance to escape.





Just like Sumo wrestlers (left), *Sauropelta* had short, strong legs that it used to lunge at its opponents. *Sauropelta* may have weighed as much as 12 Sumo wrestlers.

TENDER FOOD

Sauropelta had a narrower head than other ankylosaurs. It had small, leaf-shaped teeth which were too weak to grind up tough leaves. It sliced off tender shoots from low-growing plants with its sharp beak.



SHORT LEGS

With its short, broad legs and heavy body, *Sauropelta* had the same advantages as a Sumo wrestler! Its low centre of gravity made it very difficult to budge. Although most predators could outrun

Sauropelta, over a distance, it was probably capable of short bursts of speed. It could stop suddenly and swing its body around so that its sharp spikes entered the enemy's flesh with maximum force.

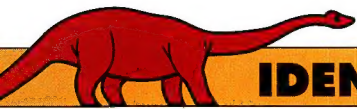
MONSTER FACTS

- **NAME:** *Sauropelta* (sawr-oh-pell-ta) means 'shielded reptile'
- **SIZE:** 7.6m long
- **FOOD:** low-growing plants
- **LIVED:** about 110 million years ago in the Early Cretaceous Period in Montana, USA

SIZE WISE

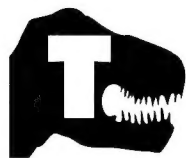


7.6m

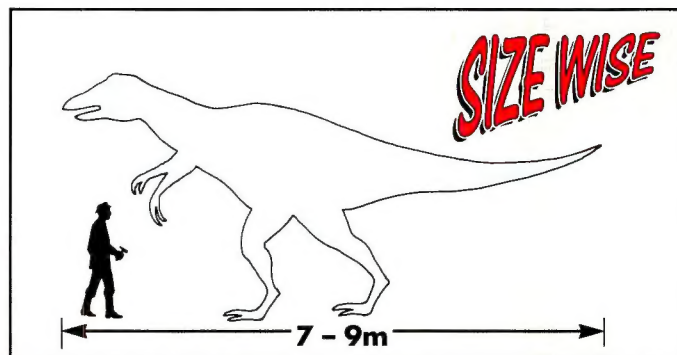


MEGALOSAURUS

Fearsome *Megalosaurus* has a special place in dinosaur history. It was the very first dinosaur to be given a name.



The first fossil remains of *Megalosaurus* were discovered in the slate mines of Stonesfield in Oxfordshire, England in 1818. Since then more than 25 dinosaurs have been given the same name. The name *Megalosaurus* has been given to many large theropods that cannot be clearly identified. The giant jaws and other bones belonging to this dinosaur that were discovered at Stonesfield, however, prove that *Megalosaurus* must have been a huge and terrifying predator.



MONSTER FACTS

- **NAME:** *Megalosaurus* (meg-a-low-saw-rus) means 'great reptile'
- **SIZE:** 7 – 9m long
- **FOOD:** meat
- **LIVED:** about 145 million years ago in the Late Jurassic Period in southern England

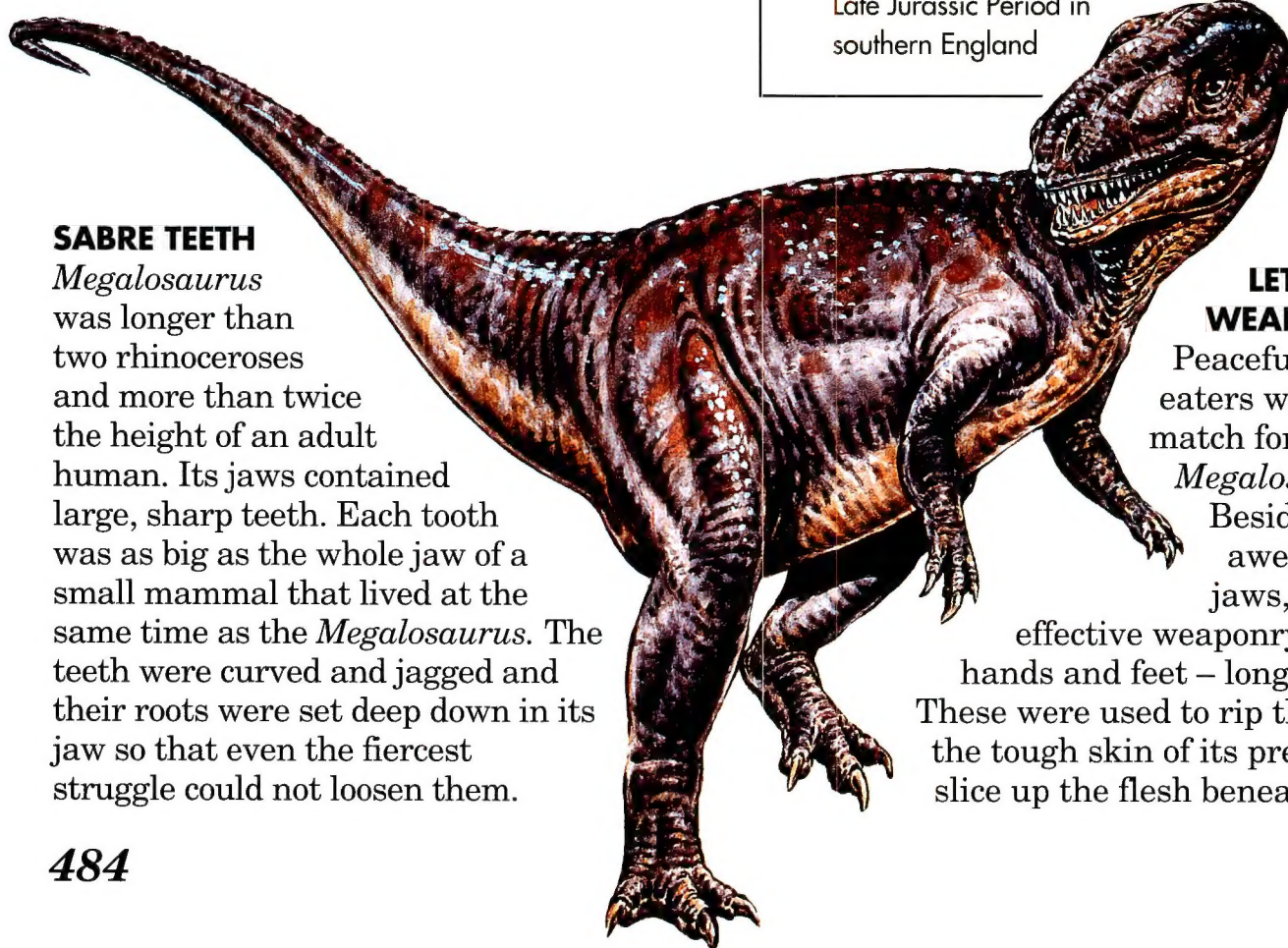
SABRE TEETH

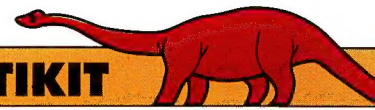
Megalosaurus was longer than two rhinoceroses and more than twice the height of an adult human. Its jaws contained large, sharp teeth. Each tooth was as big as the whole jaw of a small mammal that lived at the same time as the *Megalosaurus*. The teeth were curved and jagged and their roots were set deep down in its jaw so that even the fiercest struggle could not loosen them.

LETHAL WEAPONS

Peaceful plant-eaters were no match for hungry *Megalosaurus*.

Besides its awesome jaws, it had effective weaponry on its hands and feet – long claws. These were used to rip through the tough skin of its prey and slice up the flesh beneath.





OURANOSAURUS

***Ouranosaurus* had a 'sail' which ran along its back, hips and tail. It was made of skin supported by long spines.**



When *Ouranosaurus* lived, the nights were cold and the days were dry and hot. It is possible that its 'sail' helped *Ouranosaurus* keep its body at a steady temperature. After a chilly night, the dinosaur basked in the morning sun. Blood inside the skin of the sail soaked up the heat like a solar panel. By midday, *Ouranosaurus* needed to cool down again. Then the sail worked like a radiator releasing the stored heat.



MONSTER FACTS

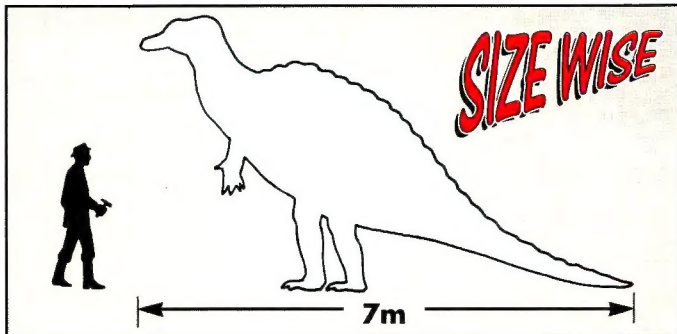
- **NAME:** *Ouranosaurus* (oo-ran-oh-saw-rus) means 'brave reptile'
- **SIZE:** 7m long
- **FOOD:** plants
- **LIVED:** about 110 million years ago in the Early Cretaceous Period in Niger, West Africa

ON ALL FOURS

Ouranosaurus was as long as two cars. Like today's kangaroo and wallaby, it could walk on two or four legs. Its hind legs were strong and powerful to support the weight of its body. When it felt like a rest, *Ouranosaurus* could tip forwards and stand on all fours, balancing easily on its hoof-shaped claws.

THUMB SPIKE

On each hand, *Ouranosaurus* had a long thumb spike. As it browsed among the hanging branches of tall conifers, predators lurked in wait. *Ouranosaurus* was not a nimble animal, so its thumb spikes were useful weapons. If attacked, it could inflict vicious stab wounds on another dinosaur, using the spikes like daggers.





The mammals take over

While the dinosaurs ruled, mammals evolved quietly in the background.

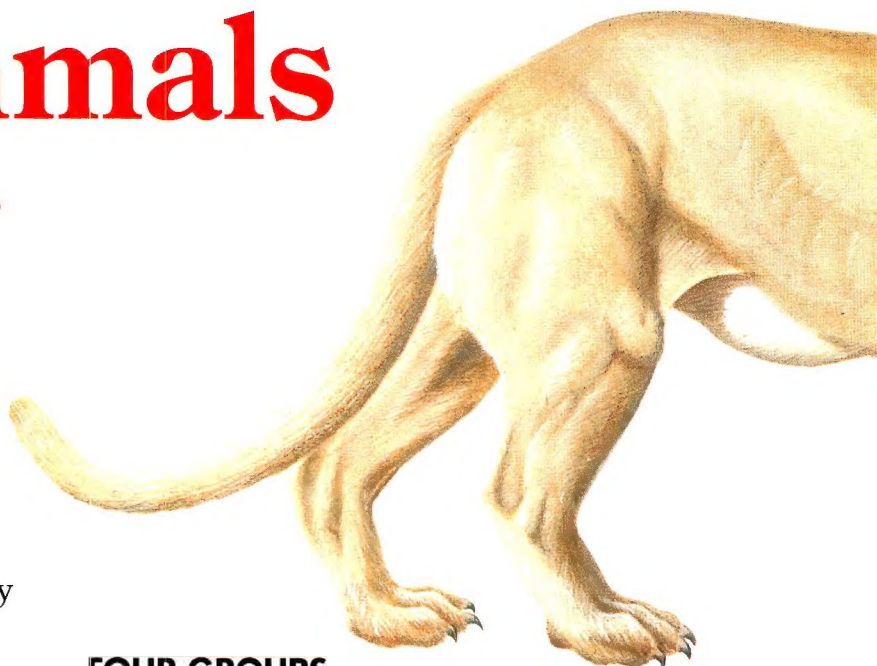


About 66 million years ago, the dinosaurs died out. So did many other great reptiles, like plesiosaurs and pterosaurs, as well as many other sea creatures and some plants. But the mammals didn't.

MAMMALS IN WAITING

At the time of the great extinction, most mammals were small creatures that scurried at night through the undergrowth. Now their day had come. They had not been wasting their time. By the end of the Cretaceous, at the time the dinosaurs died out, all the main mammal groups that we know today had evolved.

Ptilodus (right) was well adapted to life in trees.



FOUR GROUPS

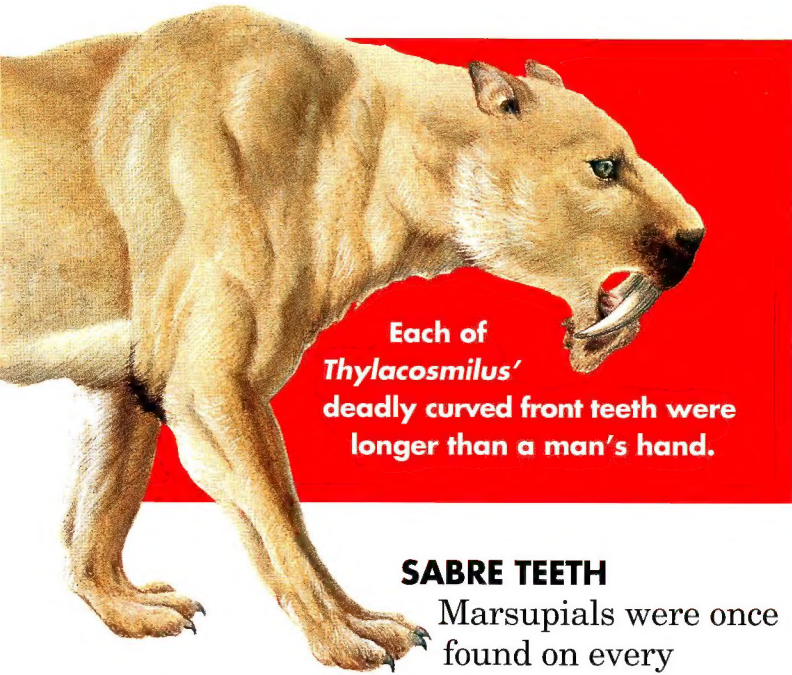
Four main groups of mammals survived when dinosaurs became extinct. These were the multituberculates (MTBs), the monotremes, the marsupials (animals with pouches) and the placentals (animals that feed their babies through a placenta, while the baby is still inside its mother).

FALSE START

The MTBs were the most successful group of mammals 65 million years ago. They evolved from small plant-eaters into larger herbivores and also hunting carnivores. One was *Ptilodus* (left), a rat-like creature from North America. But as the placental mammals went from strength to strength, the MTBs faded and disappeared 30 million years ago.

POUCHES AND POCKETS

Marsupial babies, such as kangaroos, do most of their growing in the mother's pouch, where they suck milk. The first marsupials appeared in the middle of the Cretaceous. By the end of the period, they were more successful than the placental mammals.



Each of *Thylacosmilus*' deadly curved front teeth were longer than a man's hand.

SABRE TEETH

Marsupials were once found on every continent

except Africa and Asia.

Thylacosmilus (above) was a fierce hunting marsupial the size of a leopard, with enormous sabre-toothed fangs that could slice through tough flesh. This marsupial lived in South America just a few million years ago.

GIANT KANGAROOS

Some of the prehistoric marsupials were massive. *Sthenurus* (right) was a giant kangaroo. This huge hopper even had enormous toes. It was 3m tall, so it could easily pluck leaves from the trees without stretching! But marsupials were gradually taken over by the fourth mammal group, and now the most successful – the placentals.



Sthenurus (left) had a much shorter tail than the modern kangaroo (above). *Sthenurus* was about 1m taller than today's red kangaroo, the biggest living marsupial.

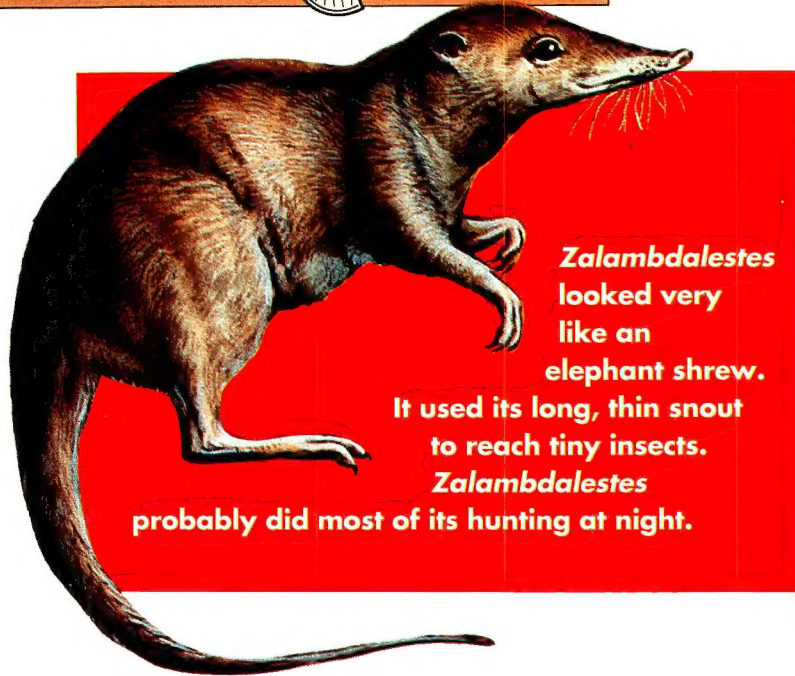
Is it true

that marsupials, such as kangaroos, are the size of a bee when they are born?

Yes. Modern-day kangaroos are tiny, pink, hairless creatures when they are born. They use their arms to drag themselves up their mother's front and climb into her pouch, where they rest, drink milk and grow. The pouch provides a safe place for these tiny babies, until they are old enough to look after themselves.

GOOD START IN LIFE

The mammals with placentas probably became successful because they gave birth to well-developed babies. And they cared for the babies until they were old enough to fend for themselves. For the last 40 million years, placental mammals have ruled the Earth. You are a placental mammal!



Zalambdalestes looked very like an elephant shrew.

It used its long, thin snout to reach tiny insects.

Zalambdalestes probably did most of its hunting at night.

FIRST IN LINE

The first placental mammals were insectivores (insect-eaters), the distant ancestors of today's hedgehogs and shrews. *Zalambdalestes* (above) had sharp teeth, big eyes and a prehensile (grasping) tail for holding on to branches. It lived in Mongolia, as the dinosaurs were fading.

OUR OWN ANCESTORS

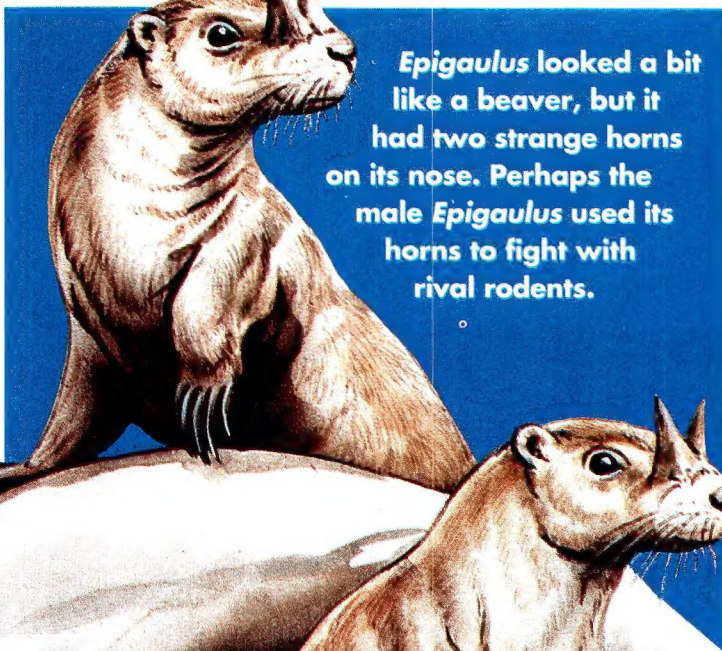
The early insectivores were probably distant ancestors of the primates, a group which includes lemurs, monkeys and humans. An early primate was *Plesiadapis*. It looked like a combination of lemur and squirrel and lived in North America almost 60 million years ago.

Plesiadapis (below) looked like a mixture between a lemur (right) and a monkey.



MOST SUCCESSFUL

The most successful group of placental mammals is the rodents, such as rats, mice, beavers and squirrels. They probably evolved from insectivores about 60 million years ago. Their huge, ever-growing incisor teeth can gnaw almost anything. *Epigaulus* was a rodent with two horns on its head. About 25cm long, it lived in North America around 15 – 20 million years ago.



Epigaulus looked a bit like a beaver, but it had two strange horns on its nose. Perhaps the male *Epigaulus* used its horns to fight with rival rodents.



Phenacodus lived 55 million years ago in North America and France. It was the size of a sheep, had a long tail and short legs.

FIRST HOOFS

Condylarths were plant-eating placentals. Their claws gradually evolved into hoofs, and they gave rise to today's hoofed animals such as horses, rhinos and deer. *Phenacodus* had five hoofed toes on each foot. Its descendants had hoofs like early horses.

FIRST FLESH-EATERS

The first successful placental flesh-eaters were creodonts. They had big heads, but small brains. Some looked like cats, others were like dogs or hyenas. *Hyaenodon* was a wolf-sized creodont that hunted the hoofed mammals about 35 million years ago.

TOOTH AND CLAW

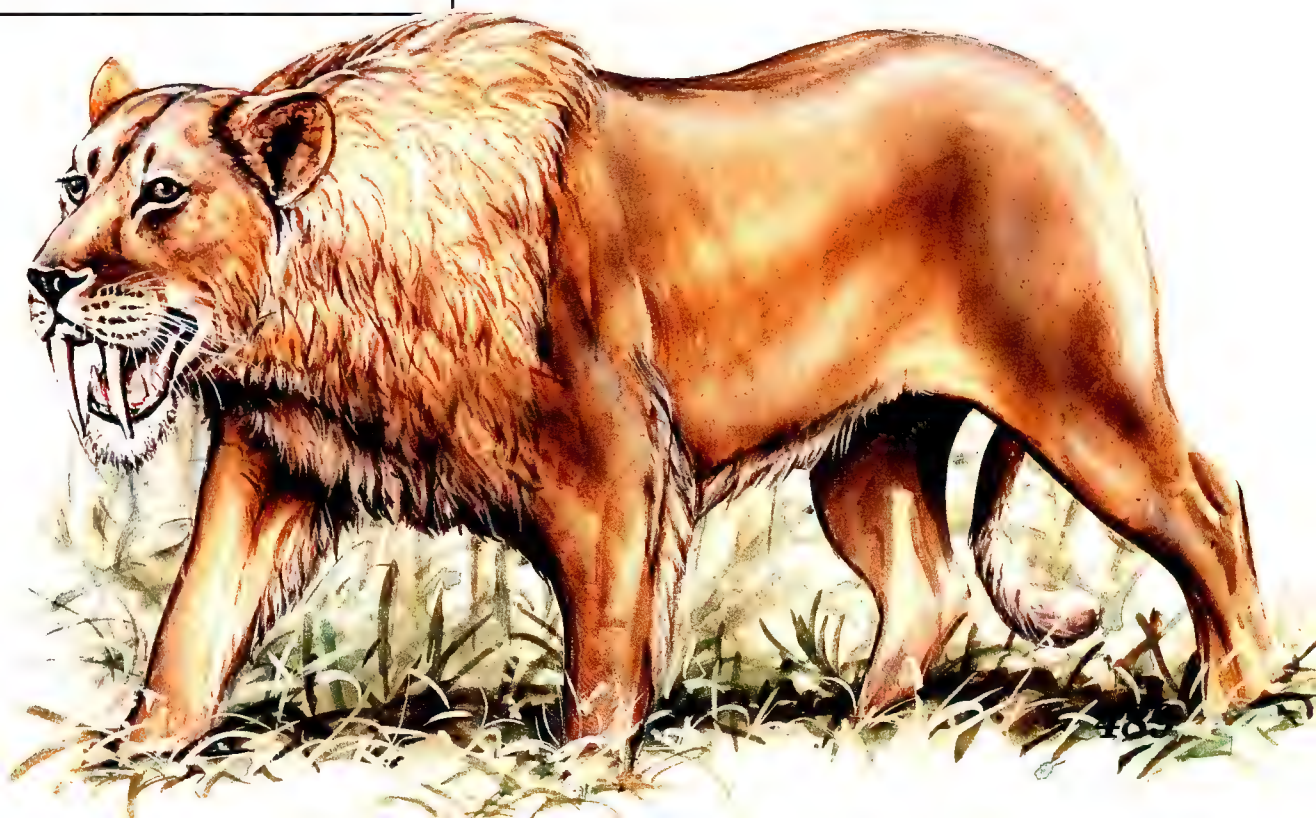
Creodonts eventually died out, and modern carnivores took over. These had paws with claws, bigger teeth, and bigger, cleverer brains. They were the ancestors of lions, dogs, wolves, bears and seals. They started out as small weasel-like creatures, but later members, such as *Smilodon*, were much larger.

What is?

A PLACENTA

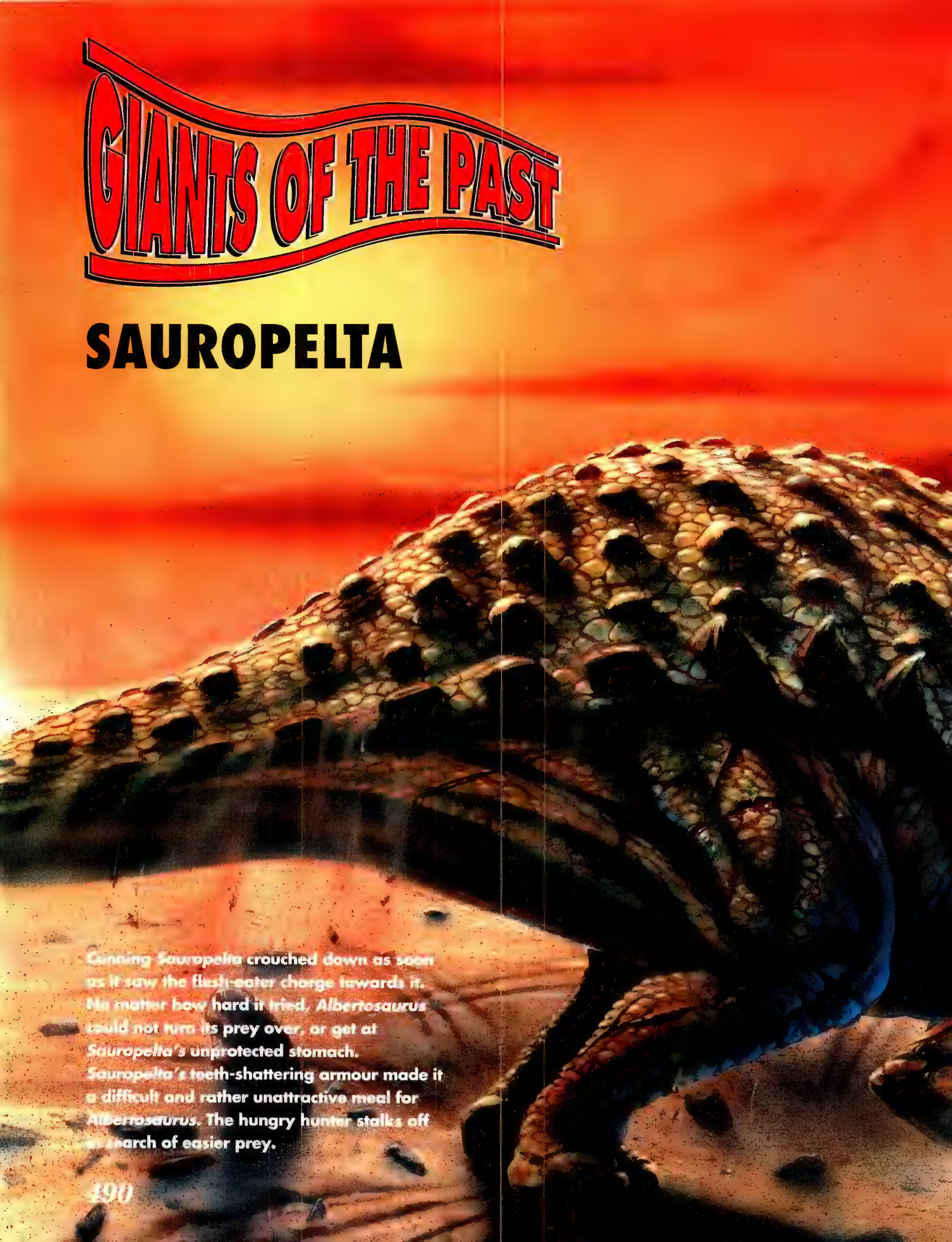
The baby of a placental mammal grows in its mother's womb. Here, it is nourished by the placenta. This special part of the mother's body brings her blood very close to the baby's blood. Nutrients (food) pass from the mother's blood, which flows into the baby's body and feeds it.

Smilodon from North America (right), had huge, stabbing fangs for piercing



GIANTS OF THE PAST

SAUROPELTA



Cunning Sauropelta crouched down as soon as it saw the flesh-eater charge towards it. No matter how hard it tried, *Albertosaurus* could not turn its prey over, or get at Sauropelta's unprotected stomach. Sauropelta's teeth-shattering armour made it a difficult and rather unattractive meal for *Albertosaurus*. The hungry hunter stalks off in search of easier prey.



3-D Gallery

30

CETIOSAURUS



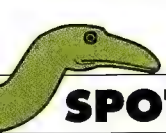
A large sauropod dinosaur is shown in a prehistoric landscape. The dinosaur is a massive, long-necked creature with a thick, wrinkled skin. It is standing in a field of low-lying green plants and ferns. In the background, there are tall, thin trees and a hazy sky. The overall scene is a reconstruction of a prehistoric environment.

- A large sauropod

- Lived about 160 million years ago in Europe and northern Africa

- Measured 18m long

- Ate plants



Common or rare?

Take a trip back through time to the Age of the Dinosaurs. Which dinosaur would you be most likely to bump into?

SPACE TRAVEL

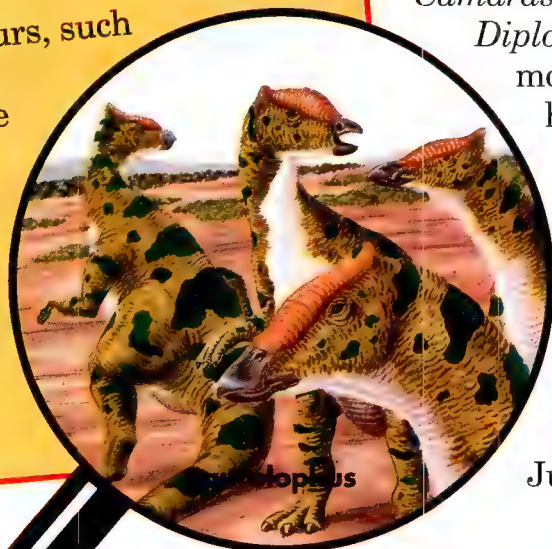
If your spaceship landed in what is now Europe, you would probably spot an *Iguanodon* or *Plateosaurus*. These were two of the most common dinosaurs. Last century, 39 *Iguanodon* were found in one place – the famous Belgian coal mine at Bernissart.



A crowd of *Iguanodon* march through a museum in Belgium.

DINOS USA

Duckbilled dinosaurs, such as *Maiasaura* and *Sauroplophus*, were the most common dinosaurs in North America. Bone beds have been found that include the bones of 10,000 hadrosaurs.

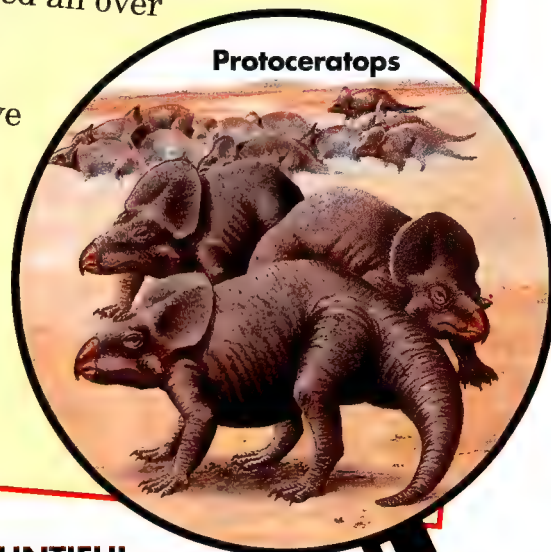


Some dinosaurs were so common that their bones fill up drawers in museums all over the world. Others were so rare that we only know them from one bone.

AS COMMON AS SHEEP?

Scientists visiting the Gobi desert in Mongolia in search of rare finds, ignore the bones of *Protoceratops*. Its bones are scattered all over the desert.

American experts have given it the nickname 'Cretaceous sheep' because it was such a common dinosaur.



BIG AND BOUNTIFUL

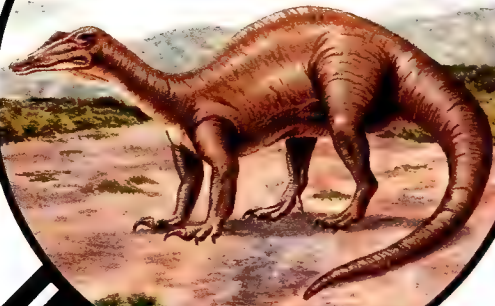
Of the larger dinosaurs, *Camarasaurus*, *Apatosaurus* and *Diplodocus* were probably the most common. Massive bone beds have been discovered in Utah, USA, with fossils of all these dinosaurs. They all lived in what is now Utah during the Jurassic. Since 1979, 10 skeletons of the Chinese sauropod *Shunosaurus* have been found. This 10m-long creature was probably a common sight in China during the Early Jurassic Period.

RARE – SO FAR!

Baryonyx is one of the rarest dinosaurs. So far, only one skeleton has been found, but it is possible that someone will stumble across a graveyard full of hundreds of

Baryonyx bones tomorrow and make it one of the most common.

Baryonyx

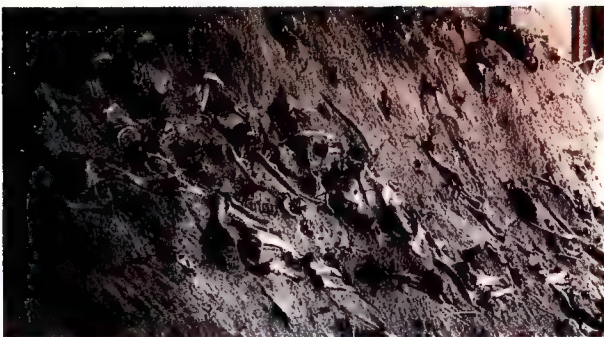


BONE COUNT

Experts work out how common or rare a dinosaur was by counting bones. If lots of dinosaur skeletons are found, the dinosaur is thought of as common. If only a few bones are found a dinosaur was probably quite rare.

MEAT-EATING CROWDS

In North America 150 million years ago, you would have had to watch out for *Allosaurus* – the largest and most abundant meat-eater during the Late Jurassic.



Masses of *Apatosaurus* and *Camarasaurus* bones at Dinosaur National Monument in the USA, prove these were common dinosaurs.

Is it true

that one of the most common dinosaurs was related to one of the rarest?

Yes. *Ouranosaurus* was a sail-backed dinosaur. Only two examples of it have been found. Apart from the 'sail' on the dinosaur's back, *Ouranosaurus* looked very like a common dinosaur, *Iguanodon*. This was because they were related.

ON ITS OWN

Only a couple of examples of *Segnosaurus* have been found. They provided such puzzling clues that scientists were not sure which family to place it in. So they decided to give it a family name of its own – the segnosaurids.

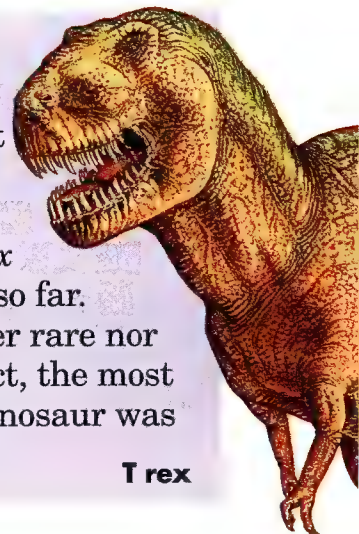
Segnosaurus



FAMOUS, NOT COMMON

T rex may be one of the most famous dinosaurs, but it was not one of the commonest. About eight complete *Tyrannosaurus rex* skeletons have been found so far. This means that it is neither rare nor particularly common. In fact, the most terrifying and intriguing dinosaur was really pretty average!

T rex



The mystery of the stones

The strangest clues are sometimes the key to very important dinosaur discoveries.



What would you think if you found a heap of pebbles inside a dinosaur? Scientists did just that 70 years ago, when they discovered 100 small stones inside a *Psittacosaurus* skeleton. They now believe those pebbles were there for a very good reason. They think they are vital clues to how that dinosaur ate. Finding the pebbles has also helped us understand how other plant-eating dinosaurs must have fed. Follow these clues to find out how the experts solved the mystery of the stones.

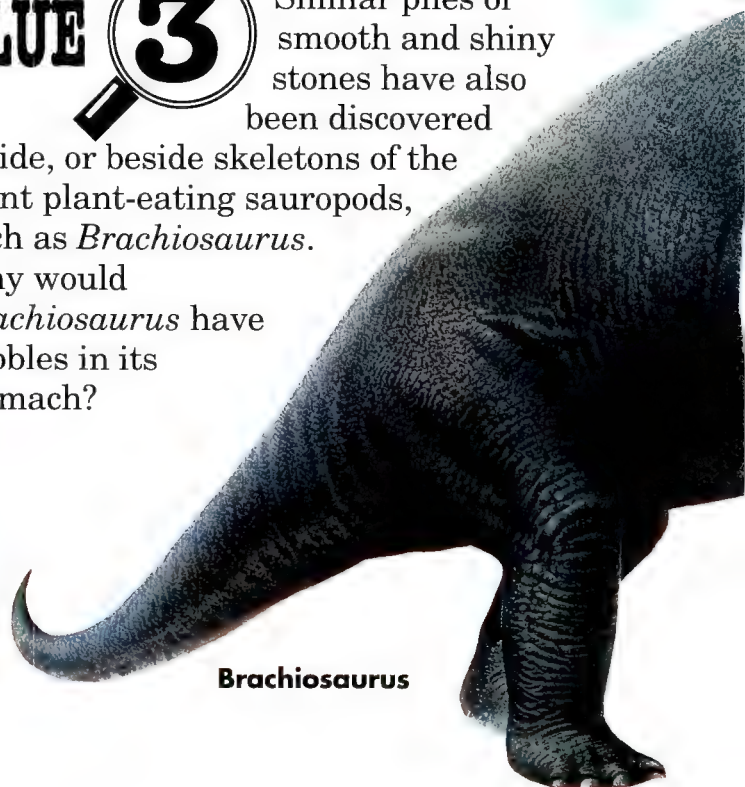
CLUE 1 A big pile of pebbles like these was found inside a *Psittacosaurus* skeleton, just where its stomach would have been. What were they doing there? And why do the pebbles look so smooth and shiny?



CLUE 2

Psittacosaurus was a medium-sized dinosaur which ate plants. It is called a parrot lizard because of its sharp beak. The dinosaur used its beak to slice through woody stems and tough leaves. The sliced-up food then passed straight down into its stomach. But tough plants have to be broken down before they can be digested properly by the animal that ate them. So how did this dinosaur manage to soften the food it swallowed?

CLUE 3 Similar piles of smooth and shiny stones have also been discovered inside, or beside skeletons of the giant plant-eating sauropods, such as *Brachiosaurus*. Why would *Brachiosaurus* have pebbles in its stomach?



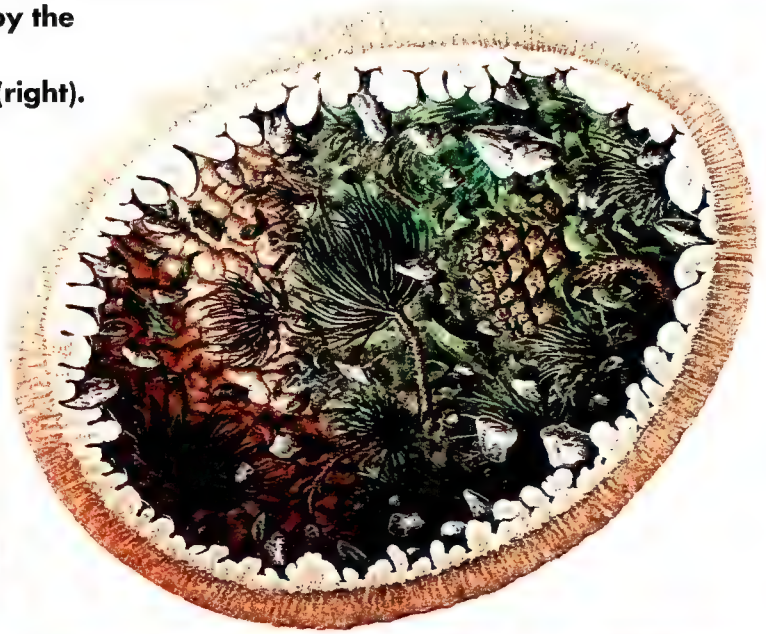
Brachiosaurus

Even the toughest plants and pine cones could be broken down by the hard stones inside *Brachiosaurus'* stomach (right).

CLUE

4

Brachiosaurus also fed on leathery plants. Like *Psittacosaurus*, it needed a very powerful digestive system to break down tough plants to get enough goodness out of them. The breaking down took place in its stomach. Leaves and stems were mixed up with digestive juices to soften them. They were also pulped down by the strong squeezing of the dinosaur's stomach muscles. Perhaps the pebbles were part of this pounding digestive system.



GOT IT!

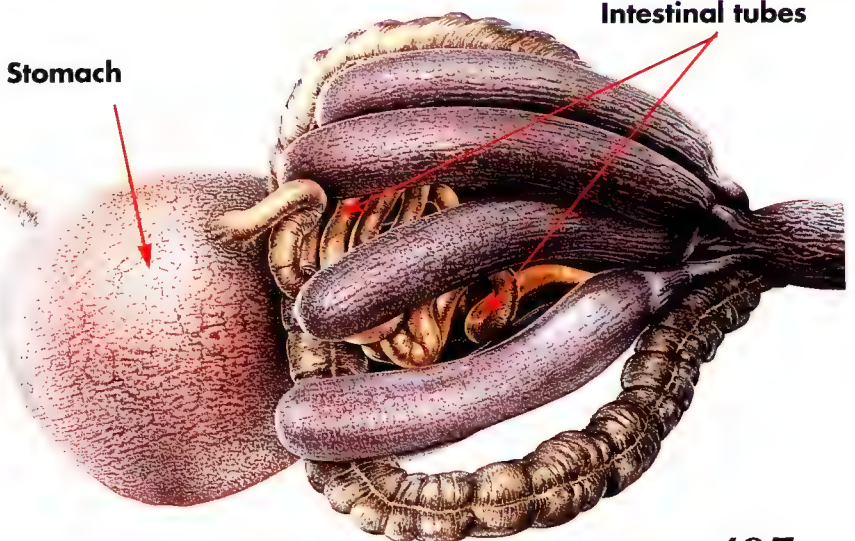
Yes, experts think *Brachiosaurus* deliberately swallowed stones to help it break down tough plant material in its stomach, rather like a giant food mixer. Other plant-eating dinosaurs, such as *Psittacosaurus*, must have done the same. The picture above of the inside of a *Brachiosaurus'* stomach shows how it probably worked. The hard stones were pushed into the plant bits and gradually ground them down into a thick paste which could be digested by the dinosaur. After years of use the stones became smooth and shiny.

Tube carrying food from mouth

Stomach

Intestinal tubes

Brachiosaurus needed a very powerful digestive system to process the 1,500kg of food it ate every day.



Plant pounders

Many dinosaurs were plant-eaters, but how do we know that they were?

 Experts can tell a lot about what a dinosaur ate by looking at its teeth. Meat-eating dinosaurs had sharp, curved teeth. They needed them to tear up animals for food. But eating plants is more complicated. So plant-eating dinosaurs had a wide range of different-shaped teeth. The shape and size of the teeth depended on what they ate.

ALL SHAPES AND SIZES

Giant plant-eating sauropods had spoon-shaped teeth for nipping with, or peg-like teeth for raking their food in. Armoured plant-eaters had leaf-shaped teeth for eating softer plants. Duckbilled dinosaurs had the most spectacular array of teeth. They had rows and rows of hundreds of tightly packed teeth. These provided fearsome-looking grinding and chopping surfaces for crushing plants.

FOOD STORERS

Have you ever seen a crocodile with cheeks? Not all animals have them, but they are very useful. Hamsters have pouch-like cheeks which they use to store food. Some dinosaurs had cheeks which they used to stop food from falling out of the sides of their mouths.



Like hamsters today, *Protoceratops* had cheeks that stopped the food falling out of the sides of its mouth when it chewed.



GETTING THE GOODNESS

Plants are difficult to digest. Dinosaurs had to spend a lot of time pounding up leaves so that they could get the nourishment (goodness in food) they needed. Experts can tell what plant-eaters probably ate by studying the shape of their teeth and the way their jaws worked. *Iguanodon* could cope with tough plants very efficiently. Its teeth and jaws worked in a special way which meant it could grind its food down to a pulp. *Iguanodon* probably lived on spiky conifers and leathery cycads. Its teeth must have got very worn down and it grew new sets to replace them.

Iguanodon probably spent most of its time searching for food and eating it.

Its sharp bony beak was perfect for cutting through tough leaves and stems.



Grazing cows grind up their food by moving their lower jaws from side to side as they chew. *Iguanodon* used its powerful jaws in a similar way to grind up the tough plants it ate.

CHEWING NOT CHOMPING

Today, animals such as horses and cattle cope with tough plants very efficiently by chewing them with their teeth. But only two types of plant-eating dinosaur were able to chew. They were the larger ornithopods, such as *Iguanodon*, and the ceratopians, such as *Triceratops*. Both the ornithopods and ceratopians were flourishing at the end of the Dinosaur Age, when the other plant-eating dinosaurs had died out. Experts think that these two groups survived for longer because they ate more efficiently than most dinosaurs.

IT'S A FACT

HUGE STOMACHS

Giant plant-eaters, such as *Brachiosaurus*, needed enormous stomachs to process the huge quantities of plants they ate.

Not all plant-eaters needed large stomachs, however. Small ornithopods, such as the stegosaurs and the ankylosaurs, fed upon softer vegetation to start with. So they did not need big stomachs to break down their food.



An *Iguanodon* tooth (left) before it was worn down.

The tooth on the right has been worn right down by eating tough plants.



'HAPPY' THE DINOSAUR

IN THE 1950s A GROUP OF STUDENTS FROM YALE UNIVERSITY WAS EXPLORING A CANYON JUST NORTH OF CANYON CITY IN COLORADO, U.S.A. LED BY FELLOW STUDENT EDWIN DELFS.

SLOW DOWN A BIT, ED! WE'RE NOT ALL SUPER FIT, YOU KNOW!

WIMP!

EDWIN DELFS WAS RIGHT. SOON A TEAM OF PALAEOANTHOLOGISTS SWARMED INTO THE AREA AND BEGAN TO DIG.

IT'S THE BIGGEST FOSSIL I'VE EVER SEEN.

LOOKS LIKE A SAUROPOD TO ME.

THE DINOSAUR WAS SO HUGE THAT IT TOOK FOUR YEARS TO COMPLETE THE EXCAVATION. IT WAS ALMOST COMPLETE WHEN DISASTER STRUCK!

SOMEONE RESCUE THEM.

NO ONE CAN THE TORRENT'S TOO STRONG.

... NEARLY 30 YEARS AFTER THE DINOSAUR, AFFECTIONATELY KNOWN AS 'HAPPY' WENT ON DISPLAY, SOMETHING BEGAN TO PUZZLE THE STAFF AT THE COLORADO MUSEUM.

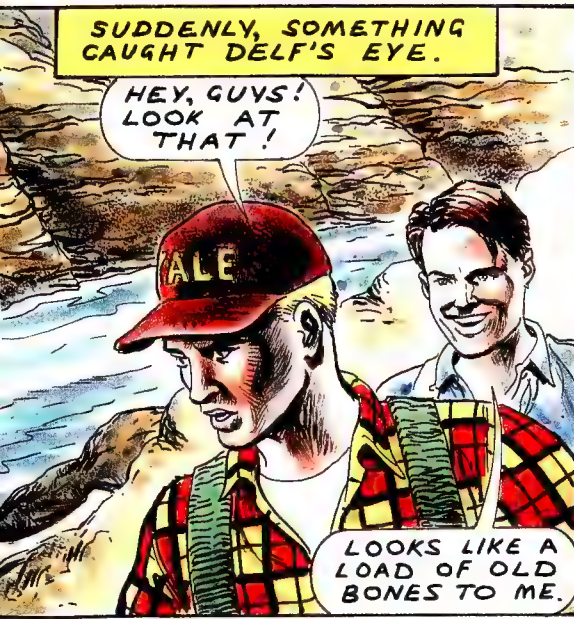
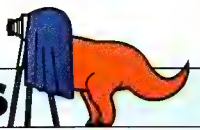
YOU KNOW, JOHN, I'VE BEEN LOOKING AT THE HAPLOCANTHOSAURUS AND 'HAPPY' HERE IS NOT QUITE THE SAME.

YOU MEAN...

... YEP. WE'RE LOOKING AT A COMPLETELY NEW SPECIES OF DINOSAUR AND HAVE BEEN FOR 30 YEARS!

TESTS SHOWED THAT THERE WAS SOMETHING EVEN MORE SPECIAL ABOUT 'HAPPY.' IT WAS THE OLDEST KNOWN NORTH AMERICAN SAUROPOD ON RECORD.

IT'S MILLIONS OF YEARS OLDER THAN WE THOUGHT.



SUDDENLY, SOMETHING CAUGHT DELF'S EYE.

HEY, GUYS! LOOK AT THAT!

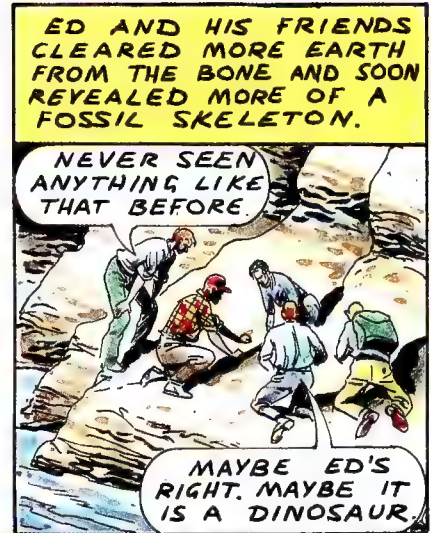
LOOKS LIKE A LOAD OF OLD BONES TO ME.



EDWIN DELFS BEGAN TO CLEAR THE AREA AROUND THE BONE.

YOU'VE GOT A POINT, DON, BUT IT'S NOT A LOAD OF OLD BONES; IT'S JUST ONE - AND I THINK IT BELONGED TO A DINOSAUR.

HE HASN'T BEEN THE SAME SINCE HE SAW THAT MOVIE ABOUT PREHISTORIC MONSTERS...



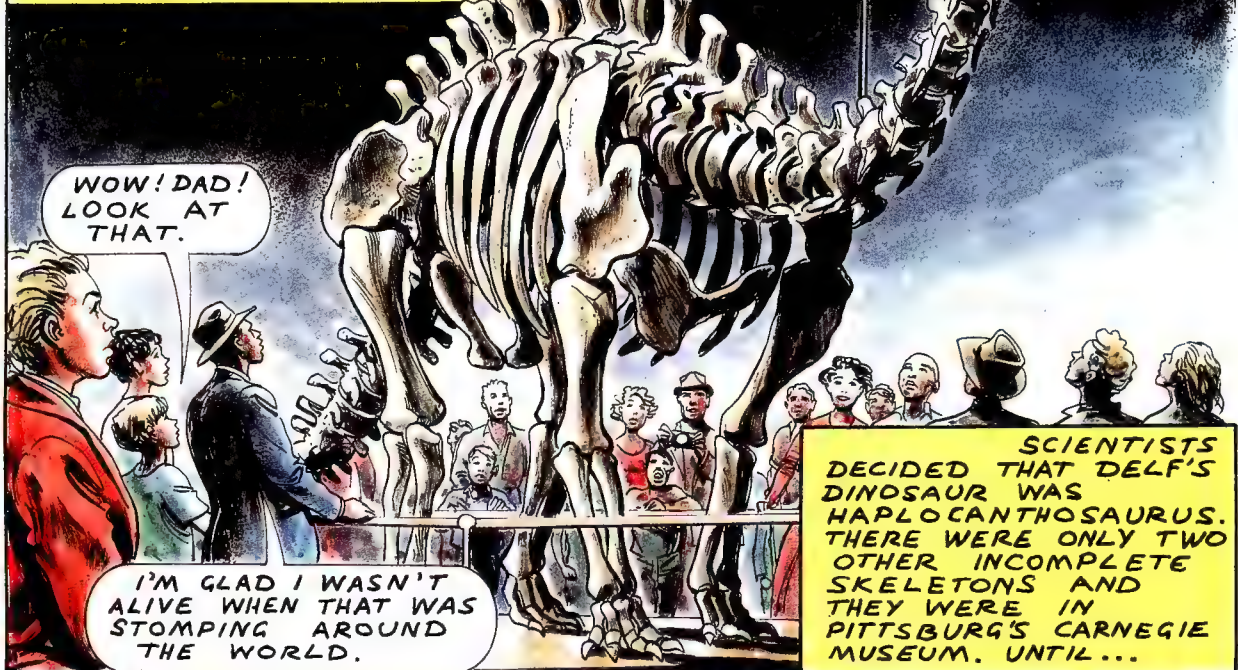
ED AND HIS FRIENDS CLEARED MORE EARTH FROM THE BONE AND SOON REVEALED MORE OF A FOSSIL SKELETON.

NEVER SEEN ANYTHING LIKE THAT BEFORE.

MAYBE ED'S RIGHT. MAYBE IT IS A DINOSAUR.



LUCKILY, SCIENTISTS MADE REPLICAS OF THE LOST BONES. THEN THE GIGANTIC SKELETON WAS DISPLAYED IN COLORADO'S CLEVELAND MUSEUM OF NATURAL HISTORY.



WOW! DAD! LOOK AT THAT.

I'M GLAD I WASN'T ALIVE WHEN THAT WAS STOMPING AROUND THE WORLD.

SCIENTISTS DECIDED THAT DELF'S DINOSAUR WAS HAPLOCANTHOSAURUS. THERE WERE ONLY TWO OTHER INCOMPLETE SKELETONS AND THEY WERE IN PITTSBURG'S CARNEGIE MUSEUM. UNTIL...



IT MUST BE FROM THE LATE JURASSIC.

THE NEW DINOSAUR WAS NAMED HAPLOCANTHOSAURUS DELFSI IN HONOUR OF EDWIN DELFS WHO DISCOVERED IT. BUT HE HAD LONG GIVEN UP FOSSIL HUNTING AND BECAME A DOCTOR IN CALIFORNIA.

THIS IS A HAPPY DAY FOR US ALL!



Improve and test your knowledge with... **Fact DinoFile**

Climb down *Diplodocus*' neck answering the questions as you go.

The real thing
If you ever visit the Quarry's Visitor Centre in Utah, USA, you will be able to see palaeontologists at work, excavating dinosaurs from rock of the Jurassic Period.

- 3** How tall was *Sthenurus*?
- a) 30m tall
 - b) 30cm tall
 - c) 3m tall

- 4** When did the first marsupials appear?
- a) during the Mid Cretaceous
 - b) during the Late Jurassic
 - c) during the Early Cretaceous

- 5** How many sets of teeth did *Heterodontosaurus* have?
- a) 5
 - b) 12
 - c) 3

- 6** Who was *Haplocanthus delfsi* named after?
- a) Haplo Smith
 - b) William Haplocanth
 - c) Edwin Delfs

- 7** Which part of *Sauropelta*'s body was not heavily armoured?
- a) its back
 - b) its head
 - c) its belly

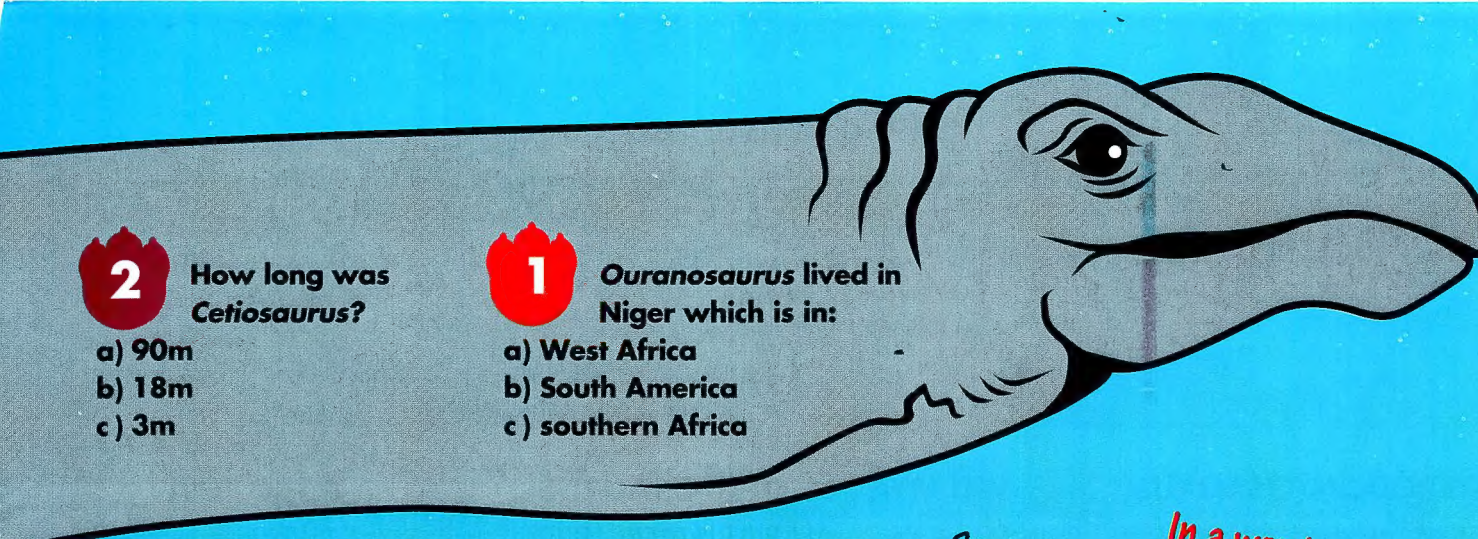
- 8** What was *Protoceratops*' nickname?
- a) parrot brain
 - b) Triassic duck
 - c) Cretaceous sheep

- 9** What was unusual about *Ouranosaurus*' hands?
- a) they had thumb spikes
 - b) they had no fingers
 - c) they had webbed fingers

- 10** What was special about *Megalosaurus*?
- a) it was the largest dinosaur
 - b) it was the first dinosaur to be named
 - c) it was the most heavily armoured dinosaur

Shield or radiator
Tuojiangosaurus, a member of the stegosaur family, might have used its bony plates for protection against its enemies. But some scientists think the plates could also have helped the dinosaur to keep warm by using the plates as a sort of radiator.

Footprint bath
One huge dinosaur footprint found in Glen Rose, Texas, can hold about 80 litres of water! That's enough for a nice deep bath!

**2**

How long was
Cetiosaurus?

- a) 90m
- b) 18m
- c) 3m

1

Ouranosaurus lived in
Niger which is in:

- a) West Africa
- b) South America
- c) southern Africa

Fossil magic

Fossils of ammonites, which existed throughout the Age of the Dinosaurs, are found in places all over the world. In western Scotland, people used to grind up these fossils and soak them in water as a worm treatment for horses. In Sweden, the fossils were thought to be the lights and candles of elves and pixies!

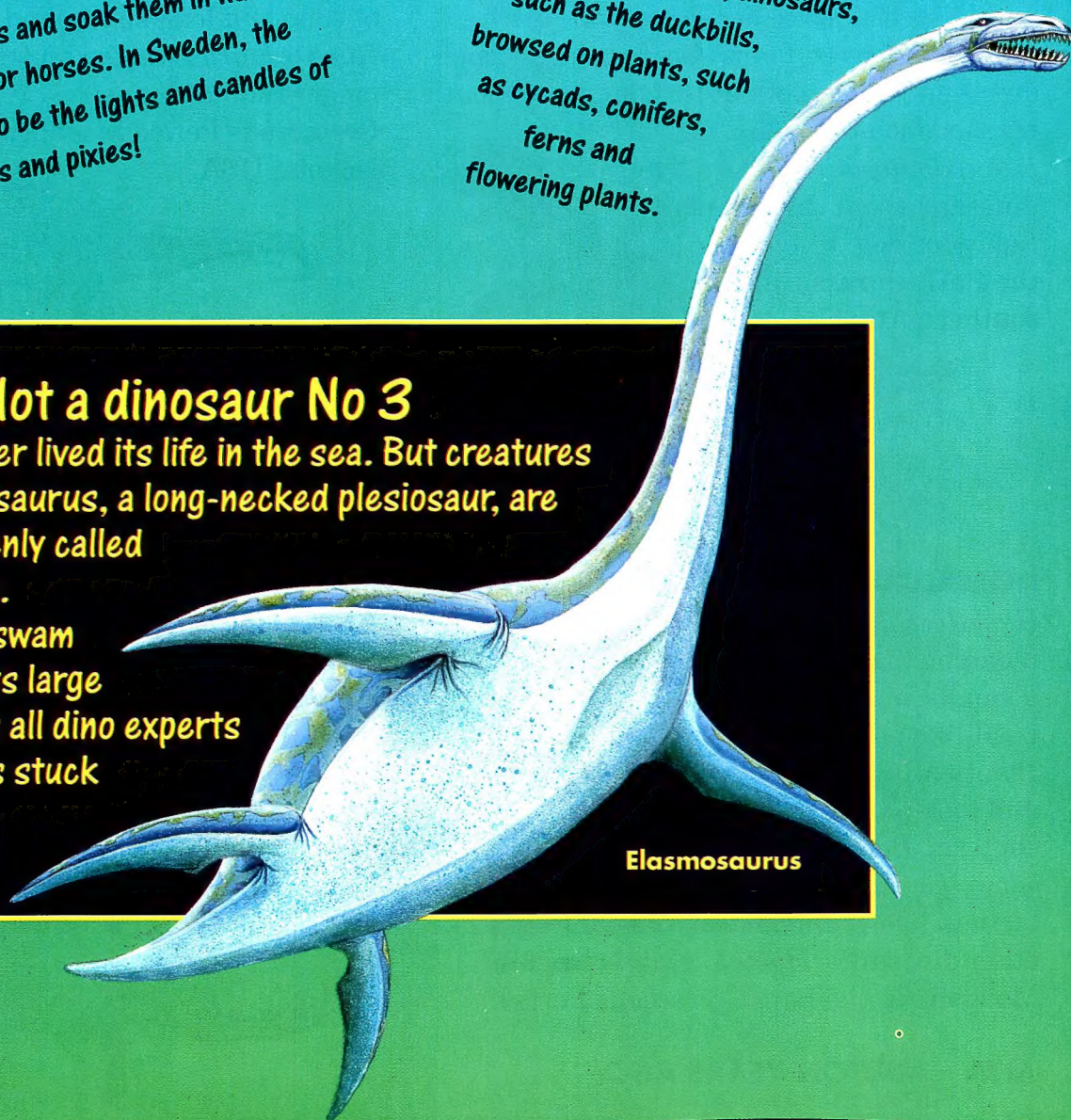
In a word

Some dinosaur books tell us that plant-eating dinosaurs graze. The word 'graze' means to eat growing grass. However, grass did not appear on Earth for another 25 million years! Instead, dinosaurs, such as the duckbills, browsed on plants, such as cycads, conifers, ferns and flowering plants.

Not a dinosaur No 3

No dinosaur ever lived its life in the sea. But creatures such as *Elasmosaurus*, a long-necked plesiosaur, are often mistakenly called dinosaurs.

Elasmosaurus swam the seas with its large flippers. And, as all dino experts know, dinosaurs stuck to dry land.

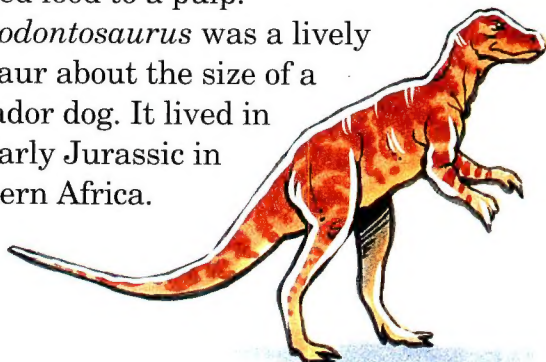


Elasmosaurus

HETERODONTOSAURUS**190 MYA**

Heterodontosaurus (het-er-oh-dont-oh-saw-rus) was a small plant-eater. Like the gazelle of today, it relied on speed to escape from predators. Its name means 'reptile with different teeth'. In fact, *Heterodontosaurus* had three sorts of teeth. They were like different blades on a food processor, each with a special job to do: sharp front teeth nipped off leaves; fangs sliced through tough stems; grinding teeth at the side of its mouth mashed food to a pulp.

Heterodontosaurus was a lively dinosaur about the size of a Labrador dog. It lived in the Early Jurassic in southern Africa.

**HOMALOCEPHALE****70 MYA**

Homalocephale (hom-al-oh-sef-al-ee), meaning 'flat head', was about the length of a small car. Its thick, knobby skull had a bead-like pattern of bone along the sides. Plant-eating *Homalocephale* lived in herds and took part in strange head-butting contests. Because it had such wide hips, some scientists think that it may have given birth to live young instead of laying eggs like other dinosaurs. *Homalocephale* lived in Mongolia in the Late Cretaceous Period.

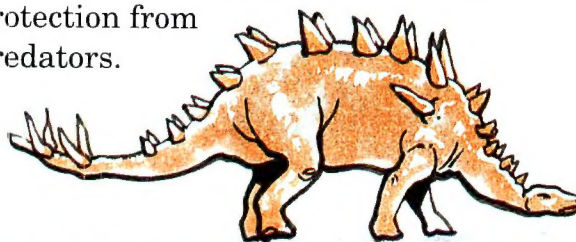
MYA = MILLION YEARS AGO**HOPLITOSAURUS****130 MYA**

Hoplitosaurus (hop-lite-oh-saw-rus) was a plant-eating dinosaur. Its name, meaning 'hoplite reptile', is taken from the hoplites, foot-soldiers of ancient Greece who wore heavy armour. *Hoplitosaurus* certainly seems to have had plenty of body armour. It was protected from predators by flat, round plates of bone and long spikes and spines.

Hoplitosaurus walked on four legs and was longer than a rhinoceros. It lived in the Early Cretaceous Period in what is now South Dakota, USA.

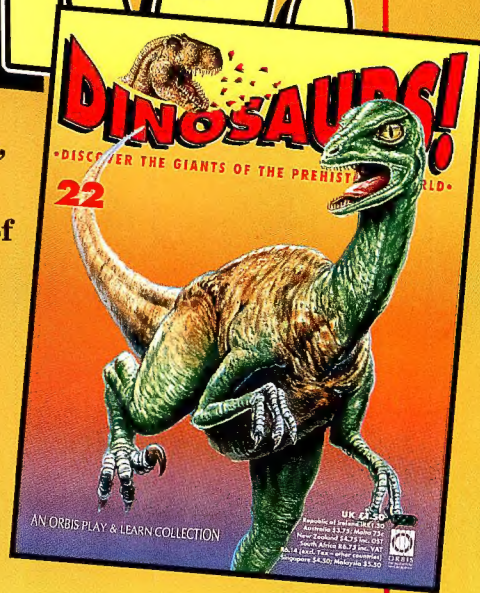
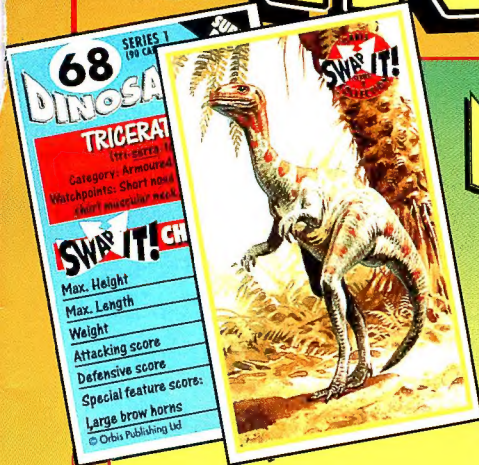
**HUAYANGOSAURUS****160 MYA**

Huayangosaurus (hoy-yang-goh-saw-rus) was a four-legged stegosaur named after an ancient province of China. It lived in China in the Mid Jurassic Period. About as long as a car, plant-eating *Huayangosaurus* is known only from one complete skull. It browsed among low-growing plants, nosing through the undergrowth with its deep, short snout. Along its back and tail *Huayangosaurus* had two rows of narrow, pointed plates. Sharp shoulder spines gave it extra protection from predators.



COMING IN PART 22 OF

DINOSAURS!

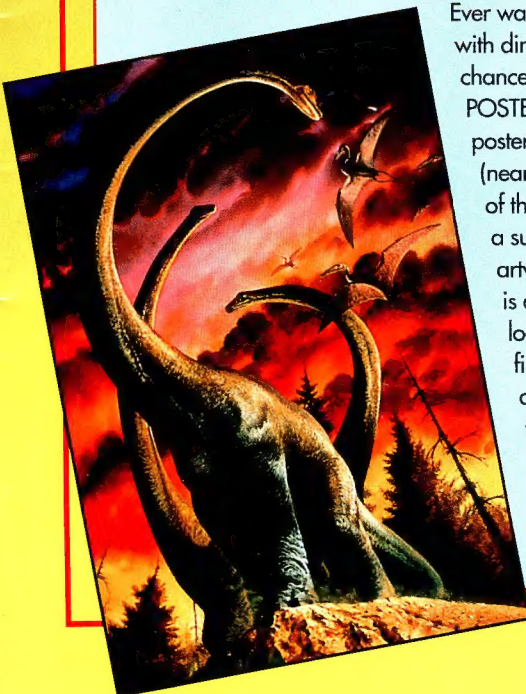


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Dr. David Norman of Cambridge
University answers your
dinosaur questions

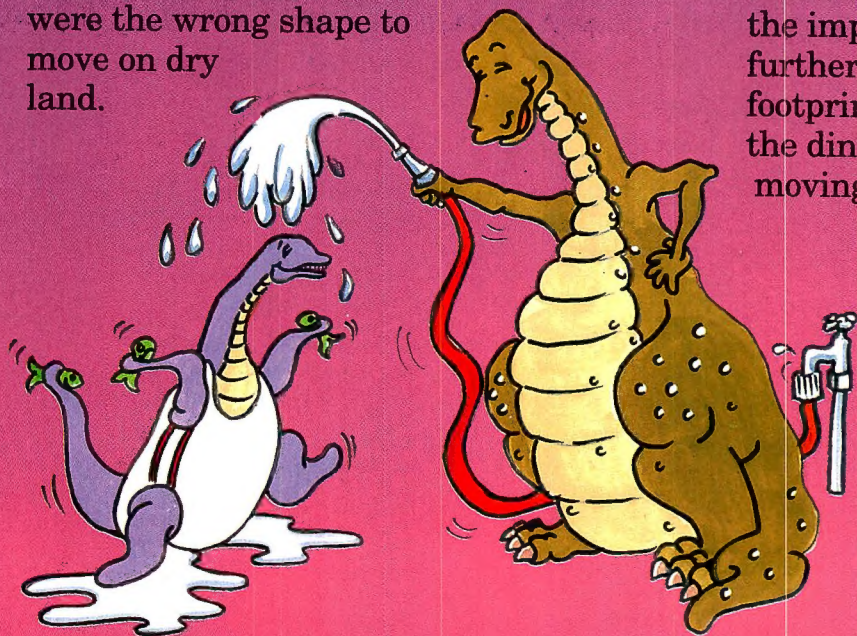
ASK THE EXPERT

Which dinosaur had the biggest brain?

The dinosaur with the biggest brain was probably *Troodon*, a very agile, meat-eating dinosaur of the Late Cretaceous. Compared with its body, *Troodon*'s brain was large, which meant that it had sharp senses. At least we would say that it may well have been one of the brainiest.

Could a sea reptile stay out of the water for long?

Some sea reptiles, such as the plesiosaurs, could stay out of water for a time. Others, like the ichthyosaurs, could not come on to the land because their legs had turned to flippers and their bodies were the wrong shape to move on dry land.



Could pterosaurs take off from the ground?

Most pterosaurs would have been able to take off from the ground simply by opening their wings. They were so light that the wind could have lifted them up and they would have floated away. Some of the early pterosaurs, such as *Dimorphodon*, may well have taken off rather like small birds do today.

How can you work out how fast a dinosaur moved?

We can tell how fast a dinosaur moved by measuring the distance between their footprints and the depth of the impression. The further apart the footprints, the faster the dinosaur was moving.

